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Preference-Based Assessments

Patient Self-Reported Health, Clinical Quality, and Patient Satisfaction in English Primary Care: Practice-Level Longitudinal Observational Study

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ABSTRACT

Objectives: To examine the association of self-reported health of patients in general practices, as measured by the 5-level EQ-5D (EQ-5D-5L), with practice clinical quality and patient-reported satisfaction with accessibility and consultations.

Methods: We used data from the General Practitioner (GP) Patient Survey to construct a practice-level EQ-5D-5L index as the health outcome. Key explanatories were patient-reported measures of satisfaction with access and consultations (also derived from the GP Patient Survey) and clinical quality measured by the achievement of clinical quality indicators reported in the Quality and Outcomes Framework. We estimated practice-level linear panel data models with random and fixed practice effects and practice and patient covariates using 2012/13 to 2016/17 data on more than 7500 English general practices.

Results: Bivariate correlations of the EQ-5D-5L index with quality measures were 0.048 for clinical quality, 0.071 for satisfaction with access, and 0.107 for satisfaction with GP consultations (all with $P<.001$). In both fixed effects regressions, which allow for unobserved time invariant practice characteristics, and random effects regressions which do not, the EQ-5D-5L index was positively associated with 1-year lags of patient satisfaction with access and GP consultations. Patient-reported health was positively associated with clinical quality in the fixed effects regressions. The implied effects were small in all cases.

Conclusion: Practice-level EQ-5D-5L is positively associated with clinical quality and with 1-year lags of patient-reported satisfaction with access and GP consultations.

Keywords: clinical quality, EQ-5D-5L, patient-reported health outcomes, patient satisfaction, primary care.

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Introduction

General practices manage long-term chronic conditions, provide preventive services, and often act as gatekeepers to other parts of the healthcare system. In most systems, they are the most frequent point of contact between patients and healthcare providers. It is therefore plausible that the quality of general (family) practices is important for population health.[1,2]

Studies of the relationship between health outcomes and primary care quality have typically used objective measures of health, such as emergency admissions for ambulatory care sensitive conditions,[3-5] hospital costs,[6] or mortality[7] and have defined quality as clinical quality. Results from these studies are mixed, with some finding that better clinical quality is associated with better health outcomes and others finding no relationship. There seem to be no studies in which the health outcome for general practice patients is derived from a validated measure of overall patient-reported health, such as the EQ-5D instrument.

It is plausible that health is improved, for a given clinical quality, when patients report better experience with access to primary care and with interactions with primary care staff. Although there is evidence of weak positive or no correlations between clinical quality and patient experience,[8-13] there have been no studies that examine the effect on health outcomes of clinical quality and patient experience.

In this article, we make use of recently available data from the General Practitioner (GP) Patient Survey (GPPS) on a patient-reported general health measure—5-level EQ-5D (EQ-5D-5L)—for patients in more than 7500 English general practices. The GPPS also collects patient views on the quality of their practice. We combine these data with information from the Quality and Outcomes Framework (QOF) on the clinical quality of each general practice. Thus, we are able to investigate, for the first time, whether the self-reported health of the practice population, as measured by the EQ-5D-5L, is associated with the clinical quality and patient views on the accessibility of their general practice and their satisfaction with their consultations with GPs.

Methods

Background—Primary Care in the English National Health Services

The English National Health Service (NHS) provides healthcare that is tax-financed and free at the point of use (apart from a small charge for approximately 10% of prescriptions). NHS primary care is provided by general practices owned and run by family doctors (GPs). All individuals residing in England are entitled to register with a general practice, and almost all do so because practices provide primary care and are gatekeepers for elective (non-emergency) hospital care. In September 2015, there were 7674 general practices with an average list of 7450 patients and 3.8 full time equivalent GPs. Practices are paid by a mix of capitation, lump sums, items of service fees, and quality incentives. Approximately 8% of the practice income is from the QOF that rewards practices for achievement of quality indicators, mainly for the management of chronic conditions and prevention.[14] Practices are reimbursed for the costs of their premises but have to fund all other expenses, such as the employment of nurses and clerical staff, from their revenue.

Data Source—GPPS

Our main data source is the GPPS - an England-wide repeated annual cross-sectional survey of patients in general practices. It was developed to provide patients the opportunity to provide feedback about their experiences of their GP practice. In each financial year (April-March), the questionnaire is sent to a random sample of approximately 5% of adult patients (different in each year and registered with their practice for at least 6 months) in every general practice. Response rates were between 33% and 39% during the 5-year period from 2012/13 to 2016/17 that we used. The survey was distributed in 2 waves (July-September and January-March) in the 4 years from 2012/13 to 2015/16 and in one wave (January-March in 2016/17). Data collection was mainly by postal paper questionnaires with options to respond online or over the telephone. The survey data are publicly available at GP practice level.[15]

Outcome: EQ-5D-5L Index Measure of Patient-Reported Health

During the period from 2012/13 to 2016/17, patients were asked to self-report their health using the EQ-5D-5L instrument over 5 dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression) with 5 severity levels for each dimension (no, slight, moderate, severe, extreme problems). The instrument was dropped from the GPPS from 2017/18 onwards.

The average response rates for the EQ-5D related questions were similar to those for the GPPS as a whole and ranged between 31% and 38% over this period. Although the EQ visual analog scale is part of the EQ-5D descriptive system, it was not included in the GPPS.

We used responses to the EQ-5D-5L instrument from the annual GPPS to construct a practice-level measure of patient health y_{gt} as

$$y_{gt} = 1 - \sum_{d=1}^{5} \sum_{l=2}^{5} w_{dl} p_{gtdl} \quad (1)$$

p_{gtdl} is the proportion of patients reporting level l in dimension d in practice g in financial year t. w_{dl} is the reduction in health for level l of dimension d compared with the best possible level 1 of dimension d. Because lower levels l within a dimension imply worse health, the weights are larger for lower levels. The weights w_{dl} are those suggested by Devlin et al.[16] Higher values of y_{gt} indicate better practice population health, ranging from 1 if all patients reported the best possible health state (11111) to −0.285 if all patients reported the worst possible health state (55555). y_{gt} is used as the dependent variable in main regression modeling.

As sensitivity tests, we apply 2 other sets of value weights to the raw data on the patient proportions p_{gtdl} to produce alternative summary measures of patient-reported health. The first alternative health measure is the crosswalk produced by van Hout et al[17] which collapses the 5 health levels in EQ-5D-5L to 3 levels and applies the Dolan[18] value weights for EQ-5D-3L. (Details are in the Appendix in Supplemental Materials at https://doi.org/10.1016/j.jval.2021.05.019.)

The second alternative health measure is the level sum score that does not use value weights derived from valuation studies but instead makes the simple but not implausible assumption that the value weights decline linearly with health levels:

$$m_{gt} = \sum_{l=1}^{5} \sum_{d=1}^{5} l p_{gtdl} \quad (2)$$

The level sum score m_{gt} for practice g at year t has a range of 5 ($5 = 1 + 1 + 1 + 1 + 1$) for the best health state to 25 ($25 = 5 + 5 + 5 + 5 + 5$) for the worst health state. This range is very different from that (1 to −0.285) for the practice-level EQ-5D-5L index in (1). To make regression results more easily comparable with those that have the EQ-5D-5L index as the dependent variable, we rescale m_{gt} as $r(m_{gt}) = 1.32125 - 0.06425 m_{gt}$, so that the minimum and maximum of the rescaled level sum score are the same as the maximum and minimum of the EQ-5D-5L index: $r(5) = 1$, $r(25) = -0.285$.

Patient-Reported Quality Measures

Patient health may be affected by how easy it is for them to access the practice and by the quality of their interactions with the practice. We measure these attributes using responses to GPPS questions about patients' experiences with their practice. We measure the accessibility of the practice as the mean of the sums of the proportions of GPPS respondents reporting that their last appointment was very or fairly convenient (Q15), that their experience in making the appointment was very or fairly good (Q18), and that they were very or fairly satisfied with surgery opening hours (Q25). We measure satisfaction with GPs consultations as the average proportion of respondents saying that in their last appointment the GP was very good or good at giving enough time, listening, explaining, involving them in decisions, and treating them with care and concern (Q21) and definitely or to some extent having confidence and trust in the GP (Q22).

Clinical Quality

The QOF rewards practices for their achievement of a range of quality indicators. The indicators are for activities intended to improve the management of patients with chronic conditions. We use the ratio clinical quality indicators that are measured as the ratio of patients for whom an indicator was achieved to the number of patients declared eligible for the indicator. For example, indicator CHD06 in 2012/13 was the proportion of eligible patients with chronic heart disease whose blood pressure was 150/90 mmHg or less. Points awarded increased linearly with achievement between a lower threshold (40% for most indicators) and an upper threshold (varying between 50% and 90% across indicators and years). Practices were paid a price per point (on average

Table 1. Summary statistics.

Variables	Mean	SD	Min	Max	Observations
EQ-5D-5L index					
Overall	0.8437	0.0396	0.5709	0.9581	34 625
Between	-	0.0358	0.6000	0.9422	7942
Within	-	0.0177	-	-	4.36
QOF population achievement (proportion)					
Overall	0.8223	0.0447	0.0000	1.0000	34 625
Between	-	0.0381	0.5181	0.9501	7942
Within	-	0.0254	-	-	4.36
QOF points (proportion of max)					
Overall	0.9563	0.0613	0.0250	1.0000	34 469
Between	-	0.0520	0.4695	1.0000	7894
Within	-	0.0373	-	-	4.37
Accessibility (proportion)					
Overall	0.8364	0.0759	0.4367	1.0000	34 625
Between	-	0.0705	0.5217	0.9967	7942
Within	-	0.0300	-	-	4.36
GP consultation satisfaction (proportion)					
Overall	0.8567	0.0615	0.4167	0.9967	34 625
Between	-	0.0568	0.4458	0.9900	7942
Within	-	0.0271	-	-	4.36

Note. QOF PA: max points weighted average population achievement rate for 33 clinical indicators. QOF points: proportions of max points achieved. Accessibility: average of proportions of GPPS respondents reporting very or fairly convenient to get an appointment, very or fairly good experience of making an appointment, very or fairly satisfied with GP surgery opening hours. GP consultation satisfaction: average of proportions of GPPS respondents reporting their GPs were very good or good at "giving you enough time," "listening to you," "explaining tests and treatments," "improving you in decisions about your care," and "treating you with care and concern" and reporting they have confidence and trust in the GPs they saw or spoke to. Between observations: N practices; Within observations: average number of years per practice.

around £125), which varied with the number of patients with the relevant condition.

We use the QOF ratio clinical indicators to construct a summary measure of the clinical quality of the practice. Points are a crude measure of clinical quality because increases in the achievement ratio above the upper threshold do not affect the number of points earned. Instead, we measured clinical quality as population achievement: the number of patients for whom the indicator was achieved divided by the total number of patients with the condition for whom the indicator was relevant.[19] We used a weighted average of population achievement, where the weights were the maximum points available for the indicators.

The QOF incentive scheme changed over time as new indicators were added, old indicators retired, and the number of QOF points and incentive thresholds attached to some indicators changed. We use 33 QOF clinical ratio indicators that were consistently defined from 2012/13 to 2016/17 (see Appendix Table A1 in Supplemental Materials at https://doi.org/10.1016/j.jval.2021.05.019). Ten indicators were for intermediate outcomes, such as the proportion of patients with diabetes whose last blood pressure was 150/90 mm Hg or less. The other 23 indicators were for process outcomes that were linked to interventions known to improve patients' health outcomes, such as the proportion of patients with peripheral arterial disease taking aspirin or an alternative antiplatelet.

Covariates

In addition to the 3 quality measures, we used a rich set of covariates as explanatories in the regression models. We included data on practice characteristics from General Medical Statistics: include list size, the number of GPs, their age, gender, and country of qualification, the number of nurses, and the type of contract the practice has with the NHS. We used the practice location to attribute the Office for National Statistics Rural-Urban Classification 2011[20] and a measure of small area deprivation from the 2015 Index of Multiple Deprivation.[21]

We use information from the GPPS on the characteristics of the respondents in each practice: age and gender proportions, ethnicity, employment status, travel to work time, proportion who can take time from work to visit GP, smoking status, provision of informal care, sexual orientation, and proportions with 16 types of long-standing health problems. We used unweighted GPPS data because explanatories were either at practice level and could not be attached to individual patients or were means across the mix of GPPS respondents in the practice.

Sample

We had initial data on 7500 to 8000 practices in England for 5 financial years from 2012/13 to 2016/17, with 38150 practice-year observations. We exclude observations with missing items. We also dropped observations from small practices with less than 1000 patients because these practices were likely to be new, in the process of closing, serving specific populations, or providing specialised services.[22,23] The final sample had 34 625 practice-year observations.

Model Specification

Our baseline specification is

$$y_{gt} = \beta_0 + Q'_{gt}\beta^Q + Q'_{g(t-1)}\beta^{Q_{t-1}} + x'^G_{gt}\beta^G + x'^P_{gt}\beta^P + D'^T\beta^T + \alpha_g + \varepsilon_{gt} \quad (3)$$

where y_{gt} is the EQ-5D-5L index for practice g in year t. Q_{gt} is a vector of quality measures (QOF population achievement, patient

Table 2. Practice quality and EQ-5D-5L.

Variables	Random effects (1)	Fixed effects (2)
QOF PA (proportion)	0.0064*	0.0092†
	(0.0037)	(0.0046)
Lagged QOF PA (proportion)	0.0067*	0.0008
	(0.0039)	(0.0051)
Access satisfaction (proportion)	−0.0006	−0.0063
	(0.0033)	(0.0043)
Lagged access satisfaction (proportion)	0.0168‡	0.0184‡
	(0.0033)	(0.0040)
GP consultation satisfaction (proportion)	−0.0021	0.0021
	(0.0036)	(0.0048)
Lagged GP consultation satisfaction (proportion)	0.0119§	0.0153§
	(0.0036)	(0.0045)
R^2 overall	0.7884	0.6830
R^2 within	0.3672	0.3840
Observations	26 683	26 683
Practices	7773	7773

Note. Dependent variable: EQ-5D-5L index. Models also include patient and practice covariate and year effects. QOF PA is the maximum points weighted average population achievement rate for 33 clinical indicators. Robust standard errors (in parenthesis) clustered on practices.
*$P<.1$; †$P<.05$; §$P<.01$; ‡$P<.001$.

satisfaction with access and with last GP consultation). $Q_{g(t-1)}$ is a vector of 1-year lags of the 3 quality measures. x_{gt}^{G} and x_{gt}^{P} are vectors of the characteristics of the practice and its GPPS respondents. D^{T} is a vector of year dummies, α_g is a practice effect, and ε_{gt} is a zero mean error term. Using 1-year lags of the quality measures reduced the estimation sample to 26 683 practice-year observations on 7773 practices.

The model allowed for the possibility that current patient health may depend on both current and past practice quality because quality has persistent effects. Using current and 1-year lags of quality also allowed for the fact that the QOF-based clinical quality measure was on the basis of practice activity over the whole year, whereas the GPPS was administered part way through the year and its timing changed during our study period.

We also included a large set of practice and patient characteristic covariates to reduce the risk of omitted variable bias from unobservable time-varying factors. To reduce the risk of bias from unobserved time invariant factors correlated with quality and health, we estimated models with random and fixed practice effects. The random effects specification assumes that the time-varying explanatories are uncorrelated with unobserved time invariant practice factors. If the assumption is valid, it is more efficient than the fixed effects specification because it makes use of both within- and between-practice variation in the data, whereas fixed effects specification relies on the within variation. We tested this assumption using the auxiliary regression test.[24]

We also estimated random and fixed effects specifications in 2 sensitivity analyses in which we replaced the practice-level EQ-5D-5L index y_{gt} with the level sum score (2) and with the 5 levels in EQ-5D-5L collapsed to 3 levels and valued with EQ-5D-3L weights.

All models were estimated with Stata 16 (StataCorp LLC, College Station, TX), and we reported robust standard errors clustered at practice level.

Results

Summary Statistics

Table 1 has summary statistics for the EQ-5D-5L index and the practice quality measures. Further statistics on these variables and the covariates are in Appendix Tables A2 and A3 in Supplemental Materials at https://doi.org/10.1016/j.jval.2021.05.019. Over the 5-year study period, the average practice-level EQ-5D-5L index was 0.844. This is slightly lower than the EQ-5D-5L index English population norm (0.876).[25] The distribution of self-reported health across EQ-5D-5L dimensions and levels changed little over the five years. The self-care dimension had the largest proportion (0.90) of level 1 (no problem) reports, and the pain/discomfort dimension had the smallest proportion (0.52). There were considerable differences in patients' self-reported health in EQ-5D-5L between practices, and the between-practice standard deviation was approximately twice as large as the within-practice standard deviation.

In each year, approximately 90% of practices achieved at least 90% of the total available QOF points (with a mean proportion of total points achieved of 0.96). The QOF population achievement rate averaged 0.82. On average, 83.64% of the GPPS respondents reported good or very good experience with accessibility of the practice, and 85.67% of the respondents reported good or very good experience with the quality of communication with their GPs. Like the health measure, most of the variation in clinical quality, and satisfaction with access and GP consultations was between practices rather within them over time.

The bivariate correlations of the EQ-5D-5L index with the quality measures were 0.048 for clinical quality, 0.052 for 1-year lag of clinical quality, 0.071 for satisfaction with access, 0.068 for 1-year lag of satisfaction with access, 0.107 for satisfaction with GP consultations, and 0.106 for 1-year lag of satisfaction with GP consultations (all with $P<.001$).

Baseline Results

The results from modelling the relationship of EQ-5D-5L with clinical quality, access satisfaction, and satisfaction with consultations are reported in Table 2 for our baseline specification (equation (3)). The full results are given in Appendix Table A4 in the Supplemental Materials at https://doi.org/10.1016/j.jval.2021.05.019. The auxiliary regression test[24] rejected ($P<.0001$) the random effects assumption that unobserved time invariant practice factors are uncorrelated with the time varying explanatories. The fixed effects specification is our preferred estimator, but because the assumptions justifying random effects are extremely strong, we report results from both random and fixed effects models.

The random effects model has positive and statistically significant coefficients (at 5% level) on lagged patient-reported satisfaction with access and GP consultations. In the model with practice fixed effects, the coefficients on lagged patient-reported satisfaction with access and GP consultations are positive and

Table 3. Practice quality and alternative health outcome measures.

Variables	EQ-5D-3L index		Rescaled EQ-5D-5L level sum score	
	Random effects (1)	Fixed effects (2)	Random effects (3)	Fixed effects (4)
QOF PA (proportion)	0.0068*	0.0117†	0.0069*	0.0100†
	(0.0039)	(0.0047)	(0.0038)	(0.0045)
Lagged QOF PA (proportion)	0.0061	0.0018	0.0059	-0.0004
	(0.0040)	(0.0052)	(0.0040)	(0.0052)
Access satisfaction (proportion)	0.0004	−0.0066	0.0001	-0.0059
	(0.0034)	(0.0045)	(0.0034)	(0.0045)
Lagged access satisfaction (proportion)	0.0153‡	0.0158‡	0.0192‡	0.0216‡
	(0.0034)	(0.0042)	(0.0035)	(0.0041)
GP consultation satisfaction (proportion)	−0.0020	0.0026	−0.0018	0.0025
	(0.0037)	(0.0049)	(0.0037)	(0.0049)
Lagged GP consultation satisfaction (proportion)	0.0145‡	0.0180‡	0.0124§	0.0156§
	(0.0037)	(0.0046)	(0.0037)	(0.0046)
R^2 overall	0.7837	0.6745	0.8023	0.6972
R^2 within	0.3582	0.3759	0.3909	0.4093
Observations	26 683	26 683	26 683	26 683
Practices	7773	7773	7773	7773

Note. Models also include patient and practice covariate and year effects. EQ-5D-5L level sum scores are rescaled to have the same range of values [−0.285, 1] as the EQ-5D-5L index. QOF PA is the maximum points weighted average population achievement rate for 33 clinical indicators. Robust standard errors (in parenthesis) clustered on practices.
*$P<.1$; †$P<.05$; §$P<.01$; ‡$P<.001$.

statistically significant, and slightly larger than in the random effects model. Current QOF clinical quality is also positively and significantly associated with EQ-5D-5L in the fixed effects model, and its coefficient is again larger than in the random effects specification.

The full set of fixed effects results (see Appendix Table A4 in Supplemental Materials at https://doi.org/10.1016/j.jval.2021.05.019) suggested that patient health was not associated with the characteristics of practice GPs (age, gender, country of qualification) or the list size of the practice, possibly because they change relatively little over time within practices. The coefficients on the characteristics of the patients responding to the GPPS were generally plausible: practices in which there was an increase in the proportion of respondents who were old, who reported chronic conditions, or who smoked experienced a reduction in the EQ-5D-5L index. There was no association between changes in the proportions of respondents in 4 categories of non-white ethnicity and changes in health. Practices in which there was an increase in the proportion of respondents who took full-time or part-time jobs had an increase in average health.

Sensitivity Analyses

In Table 3, we report results from models using alternative scoring systems to summarize the EQ-5D-5L practice profiles: the EQ-5D-3L crosswalk index values and the rescaled EQ-5D-5L level sum score. The alternative health outcome measures were very highly correlated with the practice EQ-5D-5L measures: corr(EQ-5D-3L crosswalk, EQ-5D-5L index) = 0.994, corr(EQ-5D-5L index, EQ-5D-5L level sum score) = 0.991, corr(EQ-5D-3L crosswalk, EQ-5D-5L level sum score) = 0.986. Thus, the results with the alternative health measures were very similar to those for the baseline model using the EQ-5D-5L index health measure: health was positively and statistically significantly associated with lagged patient satisfaction with access and lagged satisfaction with GP consultations in both fixed and random effects specifications, and current QOF clinical quality was positive and statistically significant in the fixed effects specifications.

Magnitudes of Effects of Quality Measures

The results in all the models imply small effects of the quality measures on patient health for all 3 measures based on the EQ-5D instrument. The estimated coefficients from the preferred fixed effects model using EQ-5D-5L index values in column (2) of Table 2 imply that the elasticities with respect to the quality measures evaluated at the mean of EQ-5D-5L ($(dy/dx)\bar{x}/\bar{y} = \hat{\beta}\bar{x}/\bar{y}$) are 0.009 (95% confidence interval [CI]: 0.000 to 0.018) for QOF population achievement, 0.019 (95% CI: 0.010 to 0.026) for lagged access satisfaction, and 0.015 (95% CI: 0.007 to 0.025) for lagged satisfaction with GP consultations.

Discussion

This is the first study to examine the relationship of a widely used measure of patient-reported general health with clinical and patient-reported measures of the quality of care provided in

general practices. Using a panel of all English general practices, we found small positive statistically significant associations of changes in the practice-level EQ-5D-5L health outcome measure with changes in current practice clinical quality as measured by the achievement of clinical indicators in the QOF and with changes in 1-year lags of patient-reported satisfaction with access and consultations with GPs. Results are robust to applying 2 sets of alternative value weights to the raw EQ-5D-5L data to produce alternative summary measures of general patient health.

A limitation of the study is that we only had access to practice level rather than individual patient level data. This means, for example, that we could not examine the relationship between measures of QOF clinical quality for care of patients with specific condition and the health of patients with those conditions. We also had retrospective observational data but reduced potential confounding by using a rich set of covariates on the characteristics of general practices and their patient populations over 5 years, and we used practice fixed effects to control for unobserved time invariant practice factors which may be associated with health and quality.

It has been suggested that EQ-5D is not a useful measure of patient outcome in general practice: patients may present more than one condition at a time, they may require referral to other healthcare providers, much of primary care treatment is preventive, and there may be lags in the improvement in outcomes after treatment.[26] These characteristics may make it more difficult to measure the impact of specific interventions, but they are not unique to primary care. Moreover, they do not remove the need for a generic measure of population health to be employed in resource allocation decisions across the health sectors.[27]

Policies to improve primary care, such as the UK QOF, have focused on measures of clinical quality of care for specific conditions. Our findings, that patient-reported accessibility and quality of interactions with GPs are positively associated with EQ-5D-5L, suggest that it would also be worthwhile to evaluate policies to improve these patient-reported aspects of quality.

Supplemental Material

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.jval.2021.05.019.

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